Investigating perceptual reality monitoring in the healthy brain using an innovative afterimage paradigm

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Background

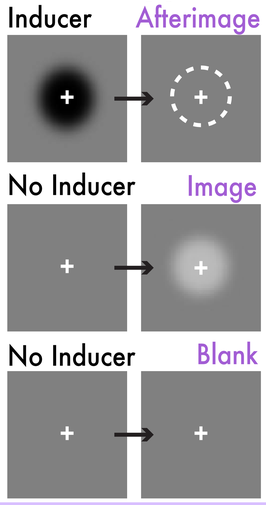
- Perceptual reality monitoring (PRM): ability to distinguish between externally present vs. internally generated perceptions (e.g., seeing vs. imagining).
- Neural and behavioral mechanisms of PRM are not well understood and have previously been investigated with voluntary imagery [1][2].
- Afterimages (illusory visual percepts occurring after adaptation to a stimulus) offer an involuntary mechanism to study PRM [3].

What are the neural mechanisms of correct and incorrect PRM judgements in the healthy brain?

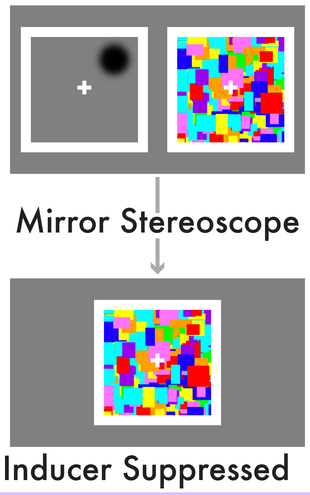
Methods

Participants N = 30 (males = 10; mean age = 25.13 years)

Trial Types



Continuous Flash Suppression

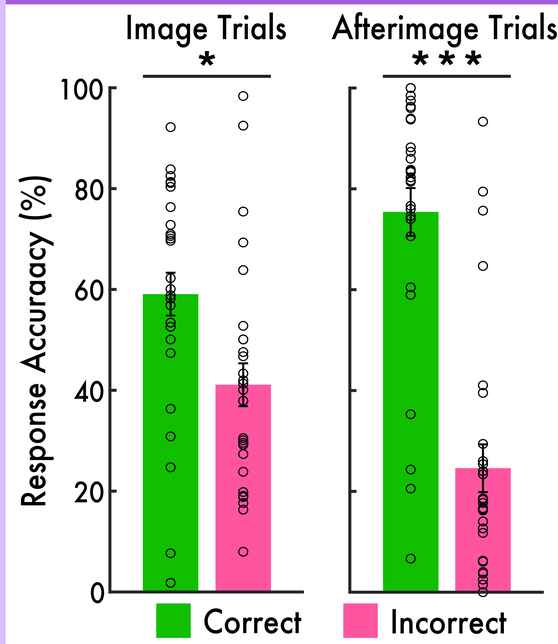


Questions

What did you see?
1: Image
2: Afterimage
3: Nothing

How confident are you?
1: Not confident
2: Slightly Confident
3: Fairly confident
4: Completely confident

Paradigm successfully induced PRM errors



Confidence levels differed for image trials, not afterimage

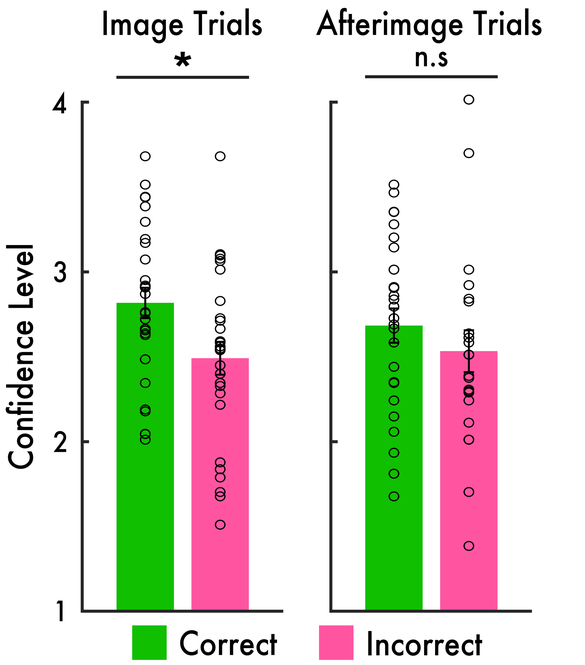
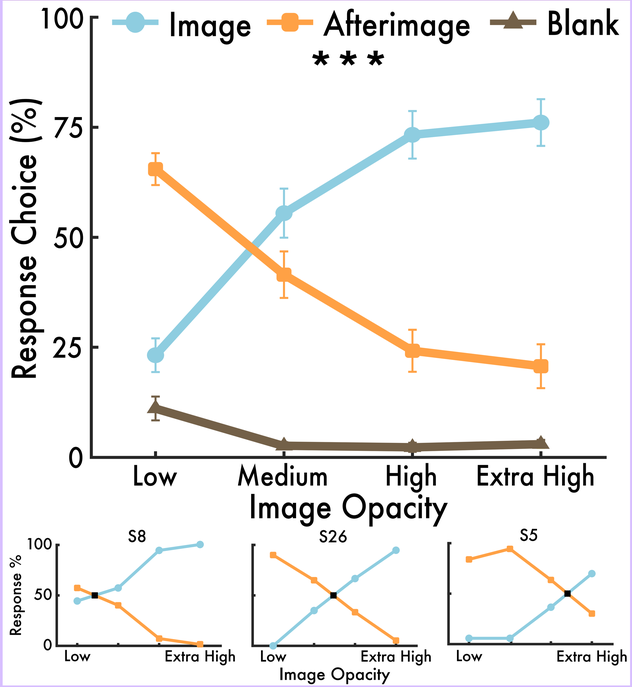
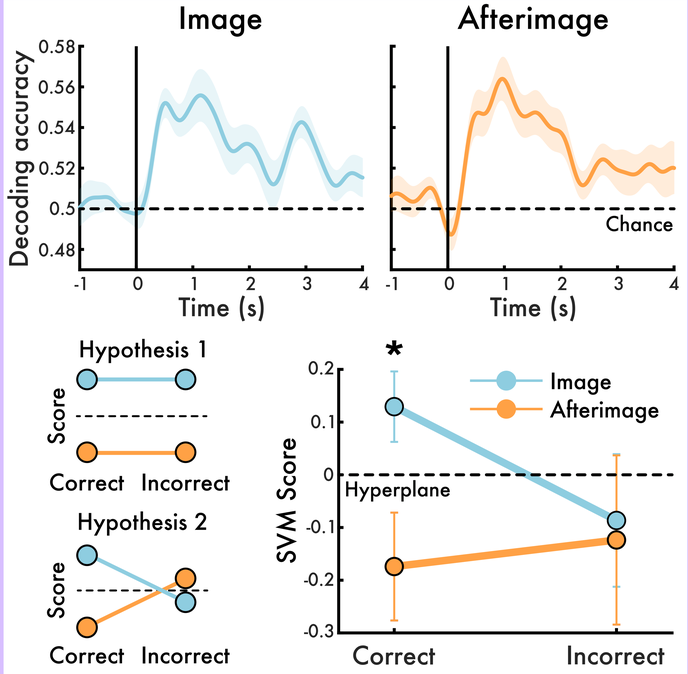


Image opacity corresponds with PRM judgements



EEG is discriminable for correct PRM judgements; not incorrect



Conclusions

- Developed novel paradigm which uses involuntary afterimages to induce erroneous PRM.
- Gained insight on the role of perceptual signal, decision-making, and metacognition when making PRM judgements.
- Image and afterimage EEG signals were decodable within 2 seconds of onset.
- Image and afterimage EEG were discriminable for correct but not incorrect PRM judgments.

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